

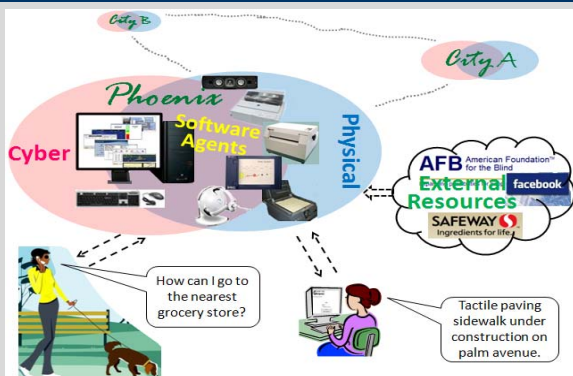
GoingEasy® with Crowdsourcing – Building Cyber-Physical Systems for People with Visual Impairment



Introduction

- **The problem:** Persistent barriers and widening digital divide faced by people who are blind in the social media era.
- **The challenges:**
 - Disparity in information-sharing among the visually impaired.
 - Limited understanding and study of the disparity.
 - Lack of methods and tools for effectively addressing these issues.
- **The project goal:** To design methodologies and develop computational tools for building new cyber-physical systems for supporting people with visual impairment in pursuing independent and active life.
- **A unique requirement:** The tight intertwining of physical and cyber systems plus active participation of the human users are the key to attaining the otherwise unlikely capabilities.
- **Key team members:**
 - Senior personnel: *Baoxin Li* (PI), School of Computing, Informatics, and Decision Systems Engineering (CIDSE); *Terri Hedgpeth* (Co-PI), ASU Disability Resource Center; *Huan Liu* (Co-PI), CIDSE; Peng Zhang (Postdoctoral Researcher), CIDSE.
 - Graduate Students (current & active in this period): *Parag Chandakkar*, *Devi Paladugu*, *Qiongjie Tian*, *Vijetha Reddy*, *Xu Zhou*, *Yilin Wang*.

A Motivating Example & Research Tasks



Key research and development tasks

- **Designing and building blind-specific CPS**
 - Blind-specific SNS; Delivering customized information.
- **Developing enabling cyber-physical capabilities**
 - Information repurposing; User/Behavior modeling and prediction.

Current Progresses & Results

• GoingEasy® Web services: new features

- New features related to adding blogging to the GoingEasy® Web have been developed.
- **Motivation:**
 - Studies showed VI users are hesitant to show some blind-specific info publicly.
 - Some VI users like writing and sharing info among the VI communities but face difficulties with existing Web based info-sharing like blogging.
- **Key features of our design:** Blind-friendly; Screen reader compatible; Supporting both reading as well as writing blogs; Supporting both both blind-specific content as well as regular content.



• Supporting call-in on GoingEasy®

- **Objective:** to allow a user to call into the GoingEasy® Web service to make queries and obtain answers. The system should automatically process queries and deliver responses.
- **Current implementation:**
 - Customer phone number is provided by Google voice.
 - Users call the number and leave questions.

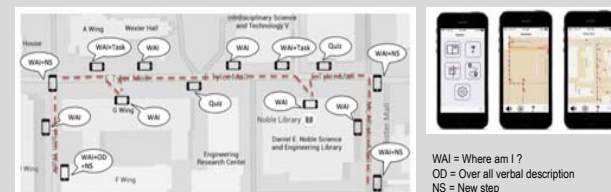


- We access these questions using Google voice API.
- Questions are processed using natural language processing.
- Community Question-and-answering techniques are applied to obtain proper answers and sent back to users in text or voice.



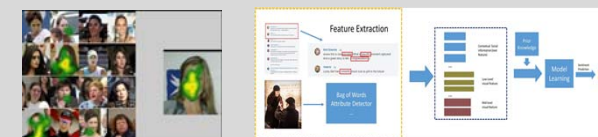
• CampusWalker : An iPhone application for campus students with visual impairment.

- A prototype application that assists students with VI explore a campus/university.
- **Developer Input :** Comprehensive list of locations, their GPS co-ordinates, and other relevant information in XML format.
- Query information from Google maps (landmarks) and Apple maps (streets); Pick a custom route.
- An app that mimics *Orientation and Mobility Training*.
- **Essential steps:** Overall verbal description; current location familiarization; information delivery on the first leg of the journey; landmark description on the go; on-site quizzes; and on-site exploration tasks.
- **Interface:** convenient audio input; enlarged route for low-vision users; ability to skip or repeat tasks/quizzes; record clues; save routes and access information off-site.



• Towards supporting interpretation of user-uploaded images

- **Objective:** to develop the capability of supporting a verbal description of a user-uploaded picture, in terms of semantic labels for the constituent regions of the picture. This is meant to provided yet another incentive features to users of the site.
- **Key efforts in this period:** (i) Understanding human performance in retrieving unfamiliar faces; (ii) Sentiment analysis in social images.



Up-coming Efforts

- **Improvement for the GoingEasy® social networking site:**
 - Fully integrating the above blogging, call-in services, and picture-interpretation modules.
 - Fully migrating the GoingEasy® site onto a local server for supporting intense computing needed for the additional functions.
- **New client-side capabilities :**
 - Linking the CampusWalker app to the GoingEasy® server to support information-sharing among registered users.
- **Additional enhancements:** User/Behaviour modeling under extremely sparse conditions; Question mining and proactive answerer probing.

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